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CHEMICAL ARTIFACTS OF SAMPLING METHODS IN GROUNDWATER

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Groundwater monitoring at the Department of Energy's Rocky Flats facility northwest of Denver predominantly uses wells constructed of PVC or stainless steel, some of which are equipped with dedicated stainless steel pumps. This presentation summarizes correlations between elevated trace metal concentrations in groundwater samples with sampling equipment and purging and sampling methods.

Metals concentrations (specifically, nickel [Ni] and chromium [Cr]) in groundwater samples from a PVC well began to increase after a dedicated stainless steel pump was installed in 1997, and exceeded site-specific action levels in 2003. An evaluation was performed to determine if the data were indicative of an advancing contaminant plume from an upgradient source or were due to other factors.

Recent data from PVC monitoring wells located closer to the possible source, which had all been sampled using a bailer, were examined and showed no similar contamination. Groundwater samples were then collected from the well in question, using the dedicated pump, both before and after the routine purge. The pump was removed, the well was redeveloped, and after 12 days it was sampled using a teflon bailer.

Concentrations of Ni and Cr were significantly higher in pumped samples of stagnant (pre-purge) than normally-sampled (post-purge) groundwater, indicating a possible borehole source, and were significantly lower in bailed samples collected following redevelopment. Ni and Cr in unfiltered samples were higher than in filtered samples, indicating the metals were present in particulate form. Pump surfaces showed visible iron oxyhydroxides. Contamination was therefore attributed to Ni and Cr sorbed on iron oxyhydroxide precipitates on the stainless steel pump surfaces and particulates in the well.

At this site, purging and sampling of wells equipped with dedicated pumps employ micropurging techniques. Purging had been considered complete when field parameters, measured continually, stabilized. Results of this evaluation show this purge volume can be inadequate in the collection of representative samples, and indicate stainless steel materials, even in neutral, uncontaminated waters, may serve as a geochemical sink and contribute significant concentrations of some trace metals.

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